

REMARKS

The present invention, as claimed in each of independent claims 1 and 24, relates to methods of beneficiation in which a collector comprises at least one oil selected from the group consisting of (1) a natural oil or a synthesized oil comprising (a) triglycerides containing fatty acids of only 20 carbons or less or (b) an ester made from a fatty acid and an alcohol; and (2) an essential oil. The "at least one oil" required by the independent claims contains "no sulfur, no nitrogen, and no phosphorous" (specification, page 6, lines 25-27).

As explained below, *Harris* (U.S. Patent No. 2,120,217) contains no teaching or suggestion of using oils that contain no sulfur, no nitrogen, and no phosphorous as the collector in a method of mineral beneficiation. Indeed, as also explained below, the efficacy of such oils for the separation of sulfide-containing minerals is surprising and unexpected.

Claim Rejections – 35 U.S.C. § 112, First Paragraph

The rejection of claims 1-3, 7-18, 24, and 32-25 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement is respectfully traversed. The recitation of "air-injection froth flotation" is fully supported by the description in the specification (e.g., page 5, lines 27-31; etc.). Accordingly, withdrawal of this ground of rejection is respectfully requested.

Claim Rejections – 35 U.S.C. § 103

The rejection of claims 1-3, 12-18, 24, and 32-35 under 35 U.S.C. § 103(a) as being unpatentable over *Harris* has been obviated. Each of independent claims 1 and 24 requires a collector comprising at least one oil that contains no sulfur, nitrogen or phosphorous. In contrast to the claimed invention, *Harris* describes ore flotation methods based on "organic chemical substances having balanced lipophile and hydrophile groups" in which the hydrophile group contains "a radical selected from the class consisting of oxygenated sulphur and oxygenated phosphorous inorganic acid radicals" (page 2, col. 2, lines 1-8, emphases added).

Harris describes methods of ore flotation directed primarily at the flotation of non-sulphide ores (e.g., page 1, col. 1, lines 35-37). The flotation agents used in the methods of *Harris* are a class of substances "characterized by the presence of both lipophile and hydrophile groups in the same molecule in a state of 'balance'" (page 1, col. 2, line 52 to page 2, col. 1, line 2). These "balanced" agents are all "freely soluble in aqueous media or dispersible therein" (page 2, col. 1, lines 6-7). As such, the agents described in *Harris* do not qualify as "collectors" in the sense of the claimed invention (i.e., chemicals that promote the hydrophobicity of a mineral; specification, page 1, lines 28-29). Moreover, the hydrophile group of the agents described in *Harris* is provided by an oxygenated sulphur or oxygenated phosphorous inorganic acid radical (page 2, col. 2, lines 1-8, emphases added), which contrasts with the oils used as collectors in the claimed invention, which contain no sulphur, phosphorous or nitrogen.

Harris describes numerous sulphate- and sulphonate-containing agents (page 2, col. 2, line 8 to page 3, col. 1, line 28), phosphate-containing agents (page 3, col. 1, lines 29-46), agents derivatized with oxygenated inorganic acid radicals such as sulphates, sulphy-carboxylic acids or phosphates (page 3, col. 1, line 47 to page 3, col. 2, line 35), and organic nitrogenous substances (page 3, col. 2, line 50 to page 4, col. 1, line 7). Each of these materials contains sulphur, phosphorous or nitrogen, which conflicts with the requirements of the claimed invention. *Harris* also describes derivatives of polyhydroxy substances and polyhydroxycarboxylic acids (page 3, col. 2, lines 36-45) but none of the materials described qualifies as a collector in the sense of the claimed invention—that is, as (1) a natural oil comprising triglycerides containing fatty acids of only 20 carbons or less or an ester made from a fatty acid and an alcohol; (2) a synthesized oil comprising triglycerides containing fatty acids of only 20 carbons or less or an ester made from a fatty acid and an alcohol; or (3) an essential oil.

In addition, Applicants have shown that the claimed oils provide surprisingly and unexpectedly good results for the selective froth flotation of sulfide-containing minerals. It is respectfully submitted that the description and Examples in the specification (e.g., page 6, line 25 to page 8, line 16; pages 15-16, Example I; pages 16-17, Example II; etc.) serve as objective evidence of nonobviousness in accordance with MPEP 716.01(a) and 2144.08.

For at least all of the reasons set forth above, Applicants respectfully submit that the claimed invention is neither anticipated by nor would have been obvious in view of *Harris*. Accordingly, withdrawal of this ground of rejection is respectfully requested.


Conclusion:

In view of the Amendments and Remarks set forth above, Applicants respectfully submit that the claimed invention is in condition for allowance. Early notification to such effect is earnestly solicited.

Applicants understand that the present examination is directed to the elected species natural oils. Independent claims 1 and 24 are generic and include the two non-elected species of oils. Accordingly, inasmuch as independent claims 1 and 24 are believed to be allowable for at least the reasons set forth above, Applicants respectfully request that claims drawn to the non-elected species of synthesized oils and essential oils be reinstated and likewise found allowable in accordance with MPEP 809.02(c).

If for any reason the Examiner feels that the above Amendment and Remarks do not put the claims in condition to be allowed, and that a discussion would be helpful, it is respectfully requested that the Examiner contact the undersigned agent directly at (312)-321-4257.

Respectfully submitted,


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